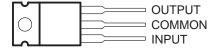
- 3-Terminal Regulators
- **Output Current up to 1.5 A**
- Internal Thermal-Overload Protection
- **High Power-Dissipation Capability**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Compensation**
- Direct Replacements for Fairchild µA7800 **Series**

### description

This series of fixed-voltage monolithic integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators.

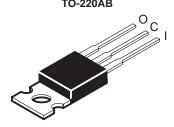
The µA7800C series is characterized for operation over the virtual junction temperature range of 0°C to 125°C.

### KC PACKAGE (TOP VIEW)

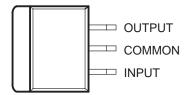


The COMMON terminal is in electrical contact with the mounting base.

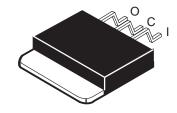
#### **TO-220AB**



#### **KTE PACKAGE** (TOP VIEW)



The COMMON terminal is in electrical contact with the mounting base.





Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

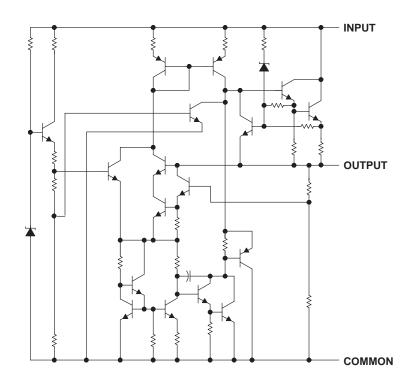


### **AVAILABLE OPTIONS**

		PACKAGED [	DEVICES	CHIP
ТЈ	VO(NOM) (V)	PLASTIC FLANGE-MOUNT (KC)	HEAT-SINK MOUNTED (KTE)	FORM (Y)
	5	μΑ7805CKC	μΑ7805CKTE	μΑ7805Υ
	6	μΑ7806CKC	μΑ7806CKTE	μΑ7806Υ
	8	μΑ7808CKC	μΑ7808CKTE	μΑ7808Υ
	8.5	μΑ7885CKC	μΑ7885CKTE	μΑ7885Υ
0°C to 125°C	10	μΑ7810CKC	μΑ7810CKTE	μΑ7810Υ
	12	μΑ7812CKC	μΑ7812CKTE	μΑ7812Υ
	15	μΑ7815CKC	μΑ7815CKTE	μΑ7815Υ
	18	μΑ7818CKC	μΑ7818CKTE	μΑ7818Υ
	24	μΑ7824CKC	μΑ7824CKTE	μΑ7824Υ

The KTE package is only available taped and reeled. Add the suffix R to the device type (e.g.,  $\mu A7805CKTER$ ). Chip forms are tested at 25°C.

### schematic





### absolute maximum ratings over operating temperature ranges (unless otherwise noted)†

		μ <b>Α78xx</b>	UNIT
Input voltage V	μA7824C	40	V
Input voltage, V <sub>I</sub>	All others	35	V
Virtual junction temperature range, T <sub>J</sub>		0 to 150	°C
, , , , , , , , , , , , , , , , , , , ,	KC package	22	°C
Package thermal impedance, θ <sub>JA</sub> (see Notes 1 and 2)	KTE package	23	
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds		260	°C
Storage temperature range, T <sub>stg</sub>		-65 to 150	°C

<sup>†</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. Maximum power dissipation is a function of  $T_J(max)$ ,  $\theta_{JA}$ , and  $T_A$ . The maximum allowable power dissipation at any allowable ambient temperature is  $P_D = (T_J(max) T_A)/\theta_{JA}$ . Operating at the absolute maximum  $T_J$  of 150°C can impact reliability. Due to variations in individual device electrical characteristics and thermal resistance, the built-in thermal overload protection may be activated at power levels slightly above or below the rated dissipation.
  - 2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

### recommended operating conditions

		MIN	MAX	UNIT
	μΑ7805C	7	25	
	μΑ7806C	8	25	
	μΑ7808C	10.5	25	
	μA7885C	10.5	25	
Input voltage, V <sub>I</sub>	μΑ7810C	12.5	28	V
	μΑ7812C	14.5	30	
	μΑ7815C	17.5	30	
	μΑ7818C	21	33	
	μΑ7824C	27	38	
Output current, I <sub>O</sub>			1.5	Α
Operating virtual junction temperature, T <sub>J</sub>	μΑ7800C series	0	125	°C



### electrical characteristics at specified virtual junction temperature, $V_I = 10 \text{ V}$ , $I_O = 500 \text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CO	NDITIONS	- +	μ <b>Α7805C</b>			UNIT
PARAWETER	1231 00	MUITIONS	TJ <sup>†</sup>	MIN	TYP	MAX	UNIT
Output voltage	$I_0 = 5 \text{ mA to 1 A},$	$V_{I} = 7 \text{ V to } 20 \text{ V},$	25°C	4.8	5	5.2	V
Output voltage	P <sub>D</sub> ≤ 15 W		0°C to 125°C	4.75		5.25	V
Input voltage regulation	V <sub>I</sub> = 7 V to 25 V		25°C		3	100	mV
Input voltage regulation	V <sub>I</sub> = 8 V to 12 V		25 C		1	50	IIIV
Ripple rejection	$V_{I} = 8 V \text{ to } 18 V,$	f = 120 Hz	0°C to 125°C	62	78		dB
Output voltage regulation	$I_0 = 5 \text{ mA to } 1.5 \text{ A}$		25°C		15	100	mV
	I <sub>O</sub> = 250 mA to 750 mA		25 C		5	50	IIIV
Output resistance	f = 1 kHz		0°C to 125°C		0.017		Ω
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA		0°C to 125°C		-1.1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		40		μV
Dropout voltage	I <sub>O</sub> = 1 A		25°C		2		V
Bias current			25°C		4.2	8	mA
Diag current change	V <sub>I</sub> = 7 V to 25 V		2001 10500			1.3	mA
Bias current change	I <sub>O</sub> = 5 mA to 1 A		0°C to 125°C			0.5	IIIA
Short-circuit output current			25°C		750		mA
Peak output current			25°C		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

# electrical characteristics at specified virtual junction temperature, $V_I$ = 11 V, $I_O$ = 500 mA (unless otherwise noted)

PARAMETER	TEST CO	NDITIONS	_ +	μ	A7806C		UNIT
PARAMETER	1231 CO	MULLIONS	TJ <sup>†</sup>	MIN	TYP	MAX	UNII
Output voltage	$I_0 = 5 \text{ mA to 1 A},$	V <sub>I</sub> = 8 V to 21 V,	25°C	5.75	6	6.25	V
Output voltage	P <sub>D</sub> ≤ 15 W		0°C to 125°C	5.7		6.3	V
Input voltage regulation	V <sub>I</sub> = 8 V to 25 V		25°C		5	120	mV
Input voltage regulation	V <sub>I</sub> = 9 V to 13 V		25.0		1.5	60	IIIV
Ripple rejection	V <sub>I</sub> = 9 V to 19 V,	f = 120 Hz	0°C to 125°C	59	75		dB
Output valta as as sulation	$I_O = 5 \text{ mA to } 1.5 \text{ A}$		25°C		14	120	>/
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA		25-0		4	60	m∨
Output resistance	f = 1 kHz		0°C to 125°C		0.019		Ω
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA		0°C to 125°C		-0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		45		μV
Dropout voltage	I <sub>O</sub> = 1 A		25°C		2		V
Bias current			25°C		4.3	8	mA
Dies surrent shangs	V <sub>I</sub> = 8 V to 25 V		0°C to 125°C			1.3	A
Bias current change	I <sub>O</sub> = 5 mA to 1 A		0.0 10 125.0		0.5		mA
Short-circuit output current			25°C		550		mA
Peak output current			25°C		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.



## electrical characteristics at specified virtual junction temperature, $V_I$ = 14 V, $I_O$ = 500 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	_ +	μ	A7808C		UNIT
PARAMETER	TEST CONDITIONS	TJ <sup>†</sup>	MIN	TYP	MAX	UNIT
Output voltage	$I_O = 5 \text{ mA to 1 A},  V_I = 10.5 \text{ V to 23 V},$		7.7	8	8.3	V
Output voltage	P <sub>D</sub> ≤ 15 W	0°C to 125°C	7.6		8.4	V
Input voltage regulation	V <sub>I</sub> = 10.5 V to 25 V	25°C		6	160	mV
Input voltage regulation	V <sub>I</sub> = 11 V to 17 V	25 C		2	80	IIIV
Ripple rejection	V <sub>I</sub> = 11.5 V to 21.5 V, f = 120 Hz	0°C to 125°C	55	72		dB
Output valtage regulation	I <sub>O</sub> = 5 mA to 1.5 A	25°C		12	160	mV
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA	25 C		4	80	IIIV
Output resistance	f = 1 kHz	0°C to 125°C		0.016		Ω
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA	0°C to 125°C		-0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	25°C		52		μV
Dropout voltage	I <sub>O</sub> = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Dies surrent change	V <sub>I</sub> = 10.5 V to 25 V	0°C to 125°C			1	
Bias current change	I <sub>O</sub> = 5 mA to 1 A	0.0 10 125.0			0.5	mA
Short-circuit output current		25°C		450		mA
Peak output current		25°C		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

# electrical characteristics at specified virtual junction temperature, $V_I$ = 15 V, $I_O$ = 500 mA (unless otherwise noted)

PARAMETER	TEST CONDITIONS	-+	μ	A7885C		UNIT
PARAMETER	TEST CONDITIONS	TJ <sup>†</sup>	MIN	TYP	MAX	UNIT
Output voltage	$I_O = 5 \text{ mA to 1 A}, \qquad V_I = 11 \text{ V to 23.5 V},$	25°C	8.15	8.5	8.85	V
Output voltage	P <sub>D</sub> ≤ 15 W	0°C to 125°C	8.1		8.9	V
Input voltage regulation	V <sub>I</sub> = 10.5 V to 25 V	25°C		6	170	mV
input voltage regulation	V <sub>I</sub> = 11 V to 17 V	25 C		2	85	IIIV
Ripple rejection	V <sub>I</sub> = 11.5 V to 21.5 V, f = 120 Hz	0°C to 125°C	54	70		dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	25°C		12	170	mV
	I <sub>O</sub> = 250 mA to 750 mA	25 C		4	85	
Output resistance	f = 1 kHz	0°C to 125°C		0.016		Ω
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$	0°C to 125°C		-0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	25°C		55		μV
Dropout voltage	I <sub>O</sub> = 1 A	25°C		2		V
Bias current		25°C		4.3	8	mA
Pion gurrant change	V <sub>I</sub> = 10.5 V to 25 V	0°C to 125°C			1	mA
Bias current change	I <sub>O</sub> = 5 mA to 1 A	0.0 10 125.0			0.5	mA
Short-circuit output current		25°C		450		mA
Peak output current		25°C		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.



## electrical characteristics at specified virtual junction temperature, $V_I$ = 17 V, $I_O$ = 500 mA (unless otherwise noted)

PARAMETER	TEST CO	NDITIONS	- +	μ <b>Α7810C</b>			UNIT
PARAWETER	TEST SCHEITIONS		TJ <sup>†</sup>	MIN	TYP	MAX	UNIT
Output voltage	$I_0 = 5 \text{ mA to 1 A},$	$V_{\parallel} = 12.5 \text{ V to } 25 \text{ V},$	25°C	9.6	10	10.4	V
Output voltage	P <sub>D</sub> ≤ 15 W		0°C to 125°C	9.5	10	10.5	V
Input voltage regulation	V <sub>I</sub> = 12.5 V to 28 V		25°C		7	200	mV
Input voltage regulation	V <sub>I</sub> = 14 V to 20 V		7 25.0		2	100	IIIV
Ripple rejection	V <sub>I</sub> = 13 V to 23 V,	f = 120 Hz	0°C to 125°C	55	71		dB
Output voltage regulation	$I_O = 5 \text{ mA to } 1.5 \text{ A}$		25°C		12	200	mV
	$I_O = 250 \text{ mA to } 750 \text{ m}$	nA	25 C		4	100	
Output resistance	f = 1 kHz		0°C to 125°C		0.018		W
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$		0°C to 125°C		-1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		70		μV
Dropout voltage	I <sub>O</sub> = 1 A		25°C		2		V
Bias current			25°C		4.3	8	mA
Diag current change	V <sub>I</sub> = 12.5 V to 28 V		0°C to 125°C			1	mA
Bias current change	I <sub>O</sub> = 5 mA to 1 A		0 C to 125 C			0.5	IIIA
Short-circuit output current			25°C		400		mA
Peak output current			25°C		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## electrical characteristics at specified virtual junction temperature, $V_I$ = 19 V, $I_O$ = 500 mA (unless otherwise noted)

PARAMETER	TEST COM	UDITIONS	_ +	μ	A7812C		UNIT
PARAWETER	TEST COI	ADITIONS	TJ <sup>†</sup>	MIN	TYP	MAX	UNIT
Output voltage	$I_0 = 5 \text{ mA to 1 A},$	V <sub>I</sub> = 14.5 V to 27 V,	25°C	11.5	12	12.5	V
Output voltage	P <sub>D</sub> ≤ 15 W		0°C to 125°C	11.4		12.6	V
Input voltage regulation	V <sub>I</sub> = 14.5 V to 30 V		25°C		10	240	mV
Input voltage regulation	V <sub>I</sub> = 16 V to 22 V				3	120	IIIV
Ripple rejection	V <sub>I</sub> = 15 V to 25 V,	f = 120 Hz	0°C to 125°C	55	71		dB
Output valtage regulation	I <sub>O</sub> = 5 mA to 1.5 A		25°C		12	240	
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA		23 C		4	120	m∨
Output resistance	f = 1 kHz		0°C to 125°C		0.018		W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA		0°C to 125°C		-1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		75		μV
Dropout voltage	I <sub>O</sub> = 1 A		25°C		2		V
Bias current			25°C		4.3	8	mA
Dies surrent shangs	V <sub>I</sub> = 14.5 V to 30 V					1	A
Bias current change	I <sub>O</sub> = 5 mA to 1 A		0°C to 125°C			0.5	mA
Short-circuit output current			25°C		350		mA
Peak output current			25°C		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.



## electrical characteristics at specified virtual junction temperature, $V_I$ = 23 V, $I_O$ = 500 mA (unless otherwise noted)

DADAMETED	TEST COMPITIONS	_ +	μ	A7815C	;	UNIT
PARAMETER	TEST CONDITIONS	T <sub>J</sub> †	MIN	TYP	MAX	ONT
Output voltage	$I_O = 5 \text{ mA to 1 A}, \qquad V_I = 17.5 \text{ V to 30 V},$	25°C	14.4	15	15.6	V
Output voltage	P <sub>D</sub> ≤ 15 W	0°C to 125°C	14.25		15.75	V
Input voltage regulation	V <sub>I</sub> = 17.5 V to 30 V	25°C		11	300	mV
Input voltage regulation	V <sub>I</sub> = 20 V to 26 V	25 0		3	150	IIIV
Ripple rejection	V <sub>I</sub> = 18.5 V to 28.5 V, f = 120 Hz	0°C to 125°C	54	70		dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	25°C		12	300	mV
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA	25 C		4	150	
Output resistance	f = 1 kHz	0°C to 125°C		0.019		W
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$	0°C to 125°C		-1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	25°C		90		μV
Dropout voltage	I <sub>O</sub> = 1 A	25°C		2		V
Bias current		25°C		4.4	8	mA
Bias current change	V <sub>I</sub> = 17.5 V to 30 V	0°C to 125°C	1		1	mA
bias current change	$I_O = 5$ mA to 1 A	0 0 10 125 0			0.5	IIIA
Short-circuit output current		25°C		230		mA
Peak output current		25°C		2.1		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

# electrical characteristics at specified virtual junction temperature, $V_I$ = 27 V, $I_O$ = 500 mA (unless otherwise noted)

PARAMETER	TEST CO	NDITIONS	_ +	μ <b>Α7818C</b>			UNIT
PARAMETER	1251 00	NDITIONS	TJ <sup>†</sup>	MIN	TYP	MAX	
Output voltage	$I_0 = 5 \text{ mA to 1 A},$	$V_{I} = 21 \text{ V to } 33 \text{ V},$	25°C	17.3	18	18.7	V
Output voltage	P <sub>D</sub> ≤ 15 W		0°C to 125°C	17.1		18.9	V
Input voltage regulation	V <sub>I</sub> = 21 V to 33 V		25°C		15	360	mV
Input voltage regulation	V <sub>I</sub> = 24 V to 30 V		25 C		5	180	IIIV
Ripple rejection	V <sub>I</sub> = 22 V to 32 V,	f = 120 Hz	0°C to 125°C	53	69		dB
Output valtage regulation	I <sub>O</sub> = 5 mA to 1.5 A		25°C		12	360	0 mV
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA		25-0		4	180	] ""V
Output resistance	f = 1 kHz		0°C to 125°C		0.022		W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA		0°C to 125°C		-1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		110		μV
Dropout voltage	I <sub>O</sub> = 1 A		25°C		2		V
Bias current			25°C		4.5	8	mA
Pigg current change	V <sub>I</sub> = 21 V to 33 V		0°C to 125°C	1		m Λ	
Bias current change	I <sub>O</sub> = 5 mA to 1 A		0 0 10 125 0			0.5	mA
Short-circuit output current		·	25°C		200		mA
Peak output current		·	25°C		2.1		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.



### electrical characteristics at specified virtual junction temperature, $V_I = 33 \text{ V}$ , $I_O = 500 \text{ mA}$ (unless otherwise noted)

PARAMETER	TEST CO	UDITIONS	_ +	μ	A7824C		UNIT
PARAMETER	TEST COI	NUTTIONS	TJ <sup>†</sup>	MIN	TYP	MAX	UNIT
Output voltage	$I_0 = 5 \text{ mA to 1 A},$	$V_{ } = 27 \text{ V to } 38 \text{ V},$	25°C	23	24	25	V
Output voltage	P <sub>D</sub> ≤ 15 W		0°C to 125°C	22.8		25.2	V
Input voltage regulation	V <sub>I</sub> = 27 V to 38 V		25°C		18	480	mV
Input voltage regulation	V <sub>I</sub> = 30 V to 36 V		25 C		6	240	IIIV
Ripple rejection	V <sub>I</sub> = 28 V to 38 V,	f = 120 Hz	0°C to 125°C	50	66		dB
Output valtage regulation	I <sub>O</sub> = 5 mA to 1.5 A		25°C		12	480	
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA		25 0		4	240	mV
Output resistance	f = 1 kHz		0°C to 125°C		0.028		W
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$		0°C to 125°C		-1.5		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz		25°C		170		μV
Dropout voltage	I <sub>O</sub> = 1 A		25°C		2		V
Bias current			25°C		4.6	8	mA
Diag current change	V <sub>I</sub> = 27 V to 38 V		0°C to 125°C	1		0	
Bias current change	I <sub>O</sub> = 5 mA to 1 A		0 0 10 125 0			0.5	mA
Short-circuit output current		·	25°C		150		mA
Peak output current			25°C		2.1		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

# electrical characteristics at specified virtual junction temperature, $V_I$ = 10 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)<sup>†</sup>

PARAMETER	TEST CONDITIONS	μ <b>Α7805</b>	μ <b>Α7805Υ</b>	
	TEST CONDITIONS	MIN TYP	MAX	UNIT
Output voltage		5		V
Input voltage regulation	$V_I = 7 \text{ V to } 25 \text{ V}$	3		mV
Input voltage regulation	$V_I = 8 V \text{ to } 12 V$	1		IIIV
Ripple rejection	$V_{I} = 8 \text{ V to } 18 \text{ V}, \qquad \qquad f = 120 \text{ Hz}$	78		dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	15		mV
	$I_{O} = 250 \text{ mA to } 750 \text{ mA}$	5		
Output resistance	f = 1 kHz	0.017		W
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$	-1.1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	40		μV
Dropout voltage	I <sub>O</sub> = 1 A	2		V
Bias current		4.2		mA
Short-circuit output current		750		mA
Peak output current		2.2		А

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.



# electrical characteristics at specified virtual junction temperature, $V_I$ = 11 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)<sup>†</sup>

PARAMETER	TEST CONDITIONS	μ <b>Α7806Υ</b>	UNIT
	TEST CONDITIONS	MIN TYP MAX	
Output voltage		6	V
Input voltage regulation	V <sub>I</sub> = 8 V to 25 V	5	mV
Input voltage regulation	V <sub>I</sub> = 9 V to 13 V	1.5	IIIV
Ripple rejection	V <sub>I</sub> = 9 V to 19 V, f = 120 Hz	75	dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	14	mV
	I <sub>O</sub> = 250 mA to 750 mA	4	
Output resistance	f = 1 kHz	0.019	W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA	-0.8	mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	45	μV
Dropout voltage	I <sub>O</sub> = 1 A	2	V
Bias current		4.3	mA
Short-circuit output current		550	mA
Peak output current		2.2	А

T Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

## electrical characteristics at specified virtual junction temperature, $V_I$ = 14 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)<sup>†</sup>

PARAMETER	TEST CONDITIONS	μ <b>Α7808Υ</b>	UNIT
	TEST CONDITIONS	MIN TYP MAX	
Output voltage		8	V
Input voltage regulation	V <sub>I</sub> = 10.5 V to 25 V	6	mV
	V <sub>I</sub> = 11 V to 17 V	2	] ""
Ripple rejection	V <sub>I</sub> = 11.5 V to 21.5 V, f = 120 Hz	72	dB
	I <sub>O</sub> = 5 mA to 1.5 A	12	mV
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA	4	
Output resistance	f = 1 kHz	0.016	W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA	-0.8	mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	52	μV
Dropout voltage	I <sub>O</sub> = 1 A	2	V
Bias current		4.3	mA
Short-circuit output current		450	mA
Peak output current		2.2	А

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.



### electrical characteristics at specified virtual junction temperature, $V_I = 15 \text{ V}$ , $I_O = 500 \text{ mA}$ , $T_J = 25^{\circ}\text{C}$ (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	μ <b>Α7885Υ</b>		UNIT
		MIN TYP	MAX	CIVIT
Output voltage		8.5		V
Input voltage regulation	V <sub>I</sub> = 10.5 V to 25 V	6		mV
Input voltage regulation	V <sub>I</sub> = 11 V to 17 V	2		IIIV
Ripple rejection	V <sub>I</sub> = 11.5 V to 21.5 V, f = 120 Hz	70		dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	12		mV
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA	4		
Output resistance	f = 1 kHz	0.016		W
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$	-0.8		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	55		μV
Dropout voltage	I <sub>O</sub> = 1 A	2		V
Bias current		4.3		mA
Short-circuit output current		450		mA
Peak output current		2.2		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

### electrical characteristics at specified virtual junction temperature, $V_I = 17 \text{ V}$ , $I_O = 500 \text{ mA}$ , $T_J = 25^{\circ}\text{C}$ (unless otherwise noted)†

PARAMETER	TEST CONDITIONS	μ <b>Α7810Υ</b>	UNIT
	TEST CONDITIONS	MIN TYP MAX	
Output voltage		10	V
Input valtage regulation	V <sub>I</sub> = 12.5 V to 28 V	7	mV
Input voltage regulation	V <sub>I</sub> = 14 V to 20 V	2	IIIV
Ripple rejection	$V_{\parallel} = 13 \text{ V to } 23 \text{ V}, \qquad \qquad f = 120 \text{ Hz}$	71	dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	12	mV
	I <sub>O</sub> = 250 mA to 750 mA	4	
Output resistance	f = 1 kHz	0.018	W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA	-1	mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	70	μV
Dropout voltage	I <sub>O</sub> = 1 A	2	V
Bias current		4.3	mA
Short-circuit output current		400	mA
Peak output current		2.2	Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.



# electrical characteristics at specified virtual junction temperature, V $_{I}$ = 19 V, I $_{O}$ = 500 mA, T $_{J}$ = 25 $^{\circ}$ C (unless otherwise noted) $^{\dagger}$

PARAMETER	TEST CONDITIONS	μ <b>Α7812Y</b>	UNIT	
	TEST CONDITIONS	MIN TYP MAX	UNII	
Output voltage		12	٧	
Input voltage regulation	V <sub>I</sub> = 14.5 V to 30 V	10	m\/	
Input voltage regulation	V <sub>I</sub> = 16 V to 22 V	3	m∨	
Ripple rejection	$V_I = 15 \text{ V to } 25 \text{ V}, \qquad \qquad f = 120 \text{ Hz}$	71	dB	
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	12	\/	
	$I_O = 250 \text{ mA to } 750 \text{ mA}$	4	mV	
Output resistance	f = 1 kHz	0.018	W	
Temperature coefficient of output voltage	$I_O = 5 \text{ mA}$	-1	mV/°C	
Output noise voltage	f = 10 Hz to 100 kHz	75	μV	
Dropout voltage	I <sub>O</sub> = 1 A	2	V	
Bias current		4.3	mA	
Short-circuit output current		350	mA	
Peak output current		2.2	А	

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## electrical characteristics at specified virtual junction temperature, $V_I$ = 23 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)<sup>†</sup>

PARAMETER	TEST COMPLIANC	μ <b>Α7815</b> \	μ <b>Α7815Υ</b>	
	TEST CONDITIONS	MIN TYP	MAX	UNIT
Output voltage		15		V
lanut valtaga ragulatian	V <sub>I</sub> = 17.5 V to 30 V	11		mV
Input voltage regulation	V <sub>I</sub> = 20 V to 26 V	3		IIIV
Ripple rejection	$V_{\parallel} = 18.5 \text{ V to } 28.5 \text{ V}, \qquad f = 120 \text{ Hz}$	70		dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	12		mV
	I <sub>O</sub> = 250 mA to 750 mA	4		
Output resistance	f = 1 kHz	0.019		W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA	-1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	90		μV
Dropout voltage	I <sub>O</sub> = 1 A	2		V
Bias current		4.4		mA
Short-circuit output current		230		mA
Peak output current		2.1		Α

T Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.



## electrical characteristics at specified virtual junction temperature, $V_I$ = 27 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)<sup>†</sup>

PARAMETER	TEST CONDITIONS	μ <b>Α7818Υ</b>		UNIT
		MIN TYP	MAX	CIVIT
Output voltage		18		V
Input voltage regulation	V <sub>I</sub> = 21 V to 33 V	15		mV
Input voltage regulation	V <sub>I</sub> = 24 V to 30 V	5		mv
Ripple rejection	V <sub>I</sub> = 22 V to 32 V, f = 120 Hz	69		dB
Output voltage regulation	I <sub>O</sub> = 5 mA to 1.5 A	12		mV
Output voltage regulation	I <sub>O</sub> = 250 mA to 750 mA	4		
Output resistance	f = 1 kHz	0.022		W
Temperature coefficient of output voltage	I <sub>O</sub> = 5 mA	-1		mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	110		μV
Dropout voltage	I <sub>O</sub> = 1 A	2		V
Bias current		4.5		mA
Short-circuit output current		200		mA
Peak output current		2.1		Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## electrical characteristics at specified virtual junction temperature, $V_I = 33 \text{ V}$ , $I_O = 500 \text{ mA}$ , $T_J = 25^{\circ}\text{C}$ (unless otherwise noted)<sup>†</sup>

PARAMETER	TEST CONDITIONS	μ <b>Α7824Υ</b>	LINUT
	TEST CONDITIONS	MIN TYP MAX	UNIT
Output voltage		24	V
Input voltage regulation	V <sub>I</sub> = 27 V to 38 V	18	mV
Input voltage regulation	V <sub>I</sub> = 30 V to 36 V	6	IIIV
Ripple rejection	$V_{\parallel} = 28 \text{ V to } 38 \text{ V}, \qquad \qquad f = 120 \text{ Hz}$	66	dB
Output voltage regulation	$I_{O} = 5 \text{ mA to } 1.5 \text{ A}$	12	mV
	I <sub>O</sub> = 250 mA to 750 mA	4	
Output resistance	f = 1 kHz	0.028	W
Temperature coefficient of output voltage	$I_{O} = 5 \text{ mA}$	-1.5	mV/°C
Output noise voltage	f = 10 Hz to 100 kHz	170	μV
Dropout voltage	I <sub>O</sub> = 1 A	2	V
Bias current		4.6	mA
Short-circuit output current		150	mA
Peak output current		2.1	Α

<sup>†</sup> Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.



### **APPLICATION INFORMATION**

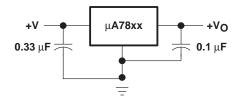


Figure 1. Fixed-Output Regulator

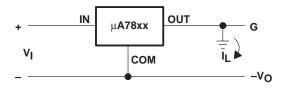
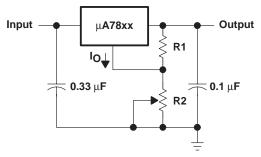


Figure 2. Positive Regulator in Negative Configuration (V<sub>I</sub> Must Float)



 $NOTE\ A:\ The\ following\ formula\ is\ used\ when\ V_{XX}\ is\ the\ nominal\ output\ voltage\ (output\ to\ common)\ of\ the\ fixed\ regulator:$ 

$$V_{O} = V_{xx} + \left(\frac{V_{xx}}{R1} + I_{Q}\right)R2$$

Figure 3. Adjustable-Output Regulator

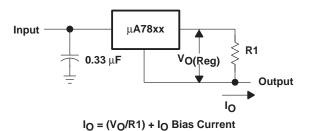


Figure 4. Current Regulator

### **APPLICATION INFORMATION**

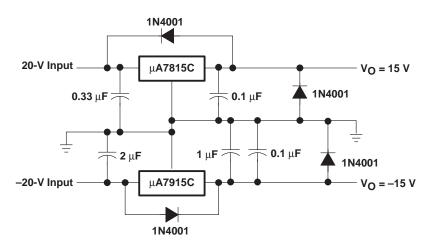


Figure 5. Regulated Dual Supply

### operation with a load common to a voltage of opposite polarity

In many cases, a regulator powers a load that is not connected to ground but, instead, is connected to a voltage source of opposite polarity (e.g., operational amplifiers, level-shifting circuits, etc.). In these cases, a clamp diode should be connected to the regulator output as shown in Figure 6. This protects the regulator from output polarity reversals during startup and short-circuit operation.

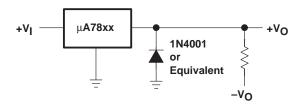


Figure 6. Output Polarity-Reversal-Protection Circuit

### reverse-bias protection

Occasionally, the input voltage to the regulator can collapse faster than the output voltage. This can occur, for example, when the input supply is crowbarred during an output overvoltage condition. If the output voltage is greater than approximately 7 V, the emitter-base junction of the series-pass element (internal or external) could break down and be damaged. To prevent this, a diode shunt can be used as shown in Figure 7.

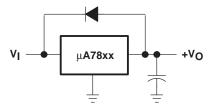


Figure 7. Reverse-Bias-Protection Circuit



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